# Oxidation and Reduction of Water by Nitrogen-containing Materials in Visible Light

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Nitrogen-containing materials such as metal oxinitride and nitride were studied as photocatalysts for the cyclic cleavage of water.

Titanium oxinitride, LaTiO2N, and tantalum nitride, Ta3N5, prepared by heating metal oxide precursors under NH3 flow have small band gap energies of 1.9-2.1 eV because the valence bands are predominantly composed of N2p orbitals, rather than O2p.

In visible light (¡ 600-650 nm), LaTiO2N and Ta3N5 reduce protons into hydrogen and oxidize water into oxygen in the presence of sacrificial donor and acceptor, respectively. Both photoreactions proceed without significant decomposition of the materials. This suggests that these materials are available for photocatalytic overall water splitting under visible light irradiation.